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AUTHOR Jonassen, David H.
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ABSTRACT

This study was conducted to investigate whether increased levels of state anxiety are associated with microcomputers. Participants included 116 undergraduate and graduate education and library science students with an age range of 20 to 55. The State-Trait Anxiety Inventory, Form Y, was administered to a control group (N=58) and an experimental (N=58) group. The control group received both portions of the test in a normal classroom environment, while the experimental group received the trait portion in class and then proceeded to the computer lab for an introductory lesson in computer-assisted instruction; during this lesson they completed the state portion of the test on the computer. Comparison of means for the two groups indicated no significant differences, although the state anxiety scores for the computer group (M=48.24) were substantially higher than the scores for the print group (M=36.12). However, within-group variance was so high for the computer group that no significant difference occurred. The trait anxiety scores (M=36.59 and M=36.79) were virtually equivalent. Only six members of the experimental group were males; while their level of state anxiety was slightly lower (M=46.12) than the level for females (M=48.36), the difference was not significant. Although the study provides some statistically inconclusive evidence for increased anxiety states when exposed to microcomputers, these results are greatly affected by individual differences, as evidenced by the high level of within-group variance. A list of references and sample test questions are included. (JB)

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STATE ANXIETY AN EXPOSURE TO MICROCOMPUTERS: ASSESSING COMPUTERPHOBIA

David H. Jonassen
School of Education
University of North Carolina at Greensboro

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Association for Educational Communications and Technology
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INTRODUCTION

It is generally accepted that the exponential growth of microcomputers in education and the workplace has produced an adverse reaction in many people that is referred to as "computerphobia", ie. fear of computers. According to Jay (1981), those suffering from computer phobia:

* are resistant to talking or thinking about computers,
* have hostile and aggressive thoughts about computers, and
* fear and become anxious about computers.

Another, more widely used term for computer phobia is computer anxiety. Computer anxiety results from fear or apprehension when using computers or when faced with the prospect of using computers. Such fears may be rational or irrational. Many people have perfectly normal reasons for fearing computers (Rubin, 1983), such as fear of displacement, loss of control, no time to learn to use them, fear of failure, fear of breaking the computer, and (inevitably) unclear documentation. Such fears, he documents, often produce the hostile reactions toward computers. Irrational fears, those without explanation, are the cause of computerphobia, which in turn results in computer anxiety. Maurer and Simonson (1984) enumerate behaviors that are associated with computer anxiety, such as:

* avoidance of computers and the area in which they are located,
* excessive caution,
* negative remarks, and
* attempts to cut short the necessary use of computers.

Computer anxiety is generally regarded as an instance of state anxiety. State anxiety is situational, that is, it results directly from some stress-producing situation during a finite period of time. Raub (1981) contends, however, that the state anxiety associated with computer phobia will more likely result in people with higher trait anxiety. Trait anxiety is a more enduring and permanent characteristic tendency to be anxious.

Computer anxiety tends to be gender specific, with many more women fearful of computers because socialization makes them less receptive to computers (Winkle & Matthews, 1982). Computer equity is an important issue which should stimulate affirmative action efforts (Bakon, et al, 1983).

While computer anxiety is a generally accepted phenomenon, its existence is often based on anecdotal data. We have no empirical proof of its existence, which raises the possibility that it may be more constructed than real, based upon our expectations. Sociologically speaking, there is good reason to expect computer anxiety. As we have all sat down to learn a new software

package, we have felt the pangs of anxiety. Yet, there is no support for the pervasive effects that are often documented in the literature. The purpose of this study was to empirically document whether increased levels of state anxiety are in fact associated with the use of microcomputers, thereby producing the anxiety-related behaviors enumerated by Maurer and Simonson (1984). While they used the same instrument as this study, the results were used to validate a Computer Anxiety Inventory rather than to establish the existence of computer anxiety. In addition, they administered the anxiety measure in its print form. In order to assess whether state anxiety increases when using microcomputers, the state anxiety measure in this study was administered by the computer.

METHOD

Participants

116 undergraduate and graduate education and library science majors with an age range of 20 to 55, enrolled at a southeastern university.

Instruments

State-Trait Anxiety Inventory, Form Y (Spielberger, 1983) is an inventory which assesses levels of anxiety states, such as tension, apprehension, worry, etc. Based upon the personality theory outlined by Spielberger (1972), the test is divided into two parts. Part 1 assess state anxiety, a transitory, momentary state of anxiety. These personality states can become more stable over time. Trait anxiety, as measured by the STAI, refers to a stable individual difference of anxiety proneness which may result in elevated state anxiety in situations perceived by the person as threatening. The trait portion was adminstered to all participants in its print form. Half the participants also received the print form of the state portion of the test. The state portion was converted to an auto-boot program for the Apple IIe which presented each question individually with the likert scale presented beneath each question (see Figure 1). After answering, subjects were asked to confirm their responses. This enabled them to change their responses because of a change of mind, keyboarding error, etc. After the 20th question, an additional question was presented which asked the participant to classify the level of their computer expereince (from "Never used one" to "Use one all the time". The computer then wrote the participants' answers off to disc. A program was written to score the state tests and print out the results.

Procedure

The control group (58 students) received both portions of the test in a normal classroom environment. The experimental group (58 students) received the trait portion in class and then proceded to the computer lab for an introductory lesson in computer assisted instruction during which they completed the

state portion of the test on the computer.

RESULTS

Exposure to Computer

The means for the two groups (N=58 each), one completing the state anxiety portion online and the other completing it in print form, were compared statistically. No significant difference between the groups were found, $t(114)=1.34$, $p>.05$. The state anxiety scores of the computer group (M=48.24) were substantially higher than the print group (M=36.12), but within group variance was so high for the computer group that no statistical difference occurred. The trait anxiety scores (M=36.59 and M=36.79) were virtually equivalent, $t(114)=-0.13$.

Level of Computer Experience

At the end of the computer-administerd state anxiety inventory, participants were asked to classify on a five-element semantic differential their level of experience with microcomputers. Based upon their declared levels of experience, they were broken into five groups of unequal size with the most indicating a moderate level of experience and only three indicating a high level of experience. An analysis of variance of the state anxiety scores of these five groups indicated no significant difference, $F(4)=0.83$, $p>.05$.

Sex Differences

Only six members of the experimental group were males. Their level of state anxiety, predictably lower from the literature, were in fact slightly lower (M=46.12) than the females (m=48.36). The difference however was not significant, $t(56)=-0.36$, $p>.05$. There was no difference in trait anxiety scores either.

DISCUSSION

This study provides some statistically inconclusive evidence of increased anxiety states when exposed to microcomputers. For many educators, they are still novel enough to produce some anxiety. An increase in state axiety should be mitigated by increased exposure to microcomputers. Microcomputers do not produce irrational fear among educators, as evidenced by this study. The setting (moving from the classroom to a computer lab) could have produced the marginal increase in state anxiety. The stongest predictor of state anxiety was still trait anxiety, $F(2)=12.10$, $p<.05$, although it accounted for less than 10% of the variance. The treatment factor added no significant amount to that. It appears that these results, like most produced by educational research, are greatly affected by individual differences, as indicated by the high level of within-group variance.

The computer equity issue was not supported by this study, although the inequity in group size makes the analysis suspect. For this group of professional and pre-professional students, anxiety toward computers should not be as great as among younger students. Most of the large sex differences seem to occur in junior high and high school.

The solution for computerphobia or computer anxiety is computer literacy (Lawton & Gerschner, 1982). Computer tension may also be reduced by using a comparative organizer to relate computer using decisions to the more familar process of selecting and using a classroom film (Rottier, 1982). This metaphorical approach is the basis for developing elaborate "training wheels systems" described in the human factors literature.

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Figure 1

Sample Run of Computer Version, SAI

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1. I FEEL CALM.....
   ------------------------------------
   ------------------------------------
    ENTER THE NUMBER THAT DESCRIBES HOW
    YOU FEEL ABOUT THE STATEMENT ABOVE
    AT THIS MOMENT.
                  NOT AT ALL.....1
                  SOMEWHAT.....2
                  MODERATELY SO.....3
                  VERY MUCH SO.....4

                                      ------ New screen

ARE YOU SURE THAT YOU MEAN 1?
          (Y OR N)?

                                      -------New screen


2. I FEEL SECURE.....
   ------------------------------------
   ------------------------------------
    ENTER THE NUMBER THAT DESCRIBES HOW
    YOU FEEL ABOUT THE STATEMENT ABOVE
    AT THIS MOMENT.
                  NOT AT ALL.....1
                  SOMEWHAT.....2
                  MODERATELY SO.....3
                  VERY MUCH SO.....4

                                     -------New screen

ARE YOU SURE THAT YOU MEAN 3?
          (Y OR N)?

                                     -------New screen


3. I AM TENSE.....
   ------------------------------------
   ------------------------------------
    ENTER THE NUMBER THAT DESCRIBES HOW
    YOU FEEL ABOUT THE STATEMENT ABOVE
    AT THIS MOMENT.
                  NOT AT ALL.....1
                  SOMEWHAT.....2
                  MODERATELY SO.....3
                  VERY MUCH SO.....4
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